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J.P. Riddle, H.E. Smith, C.J. Jones



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Does written emotional disclosure improve the psychological and physical health of caregivers? A systematic review and meta-analysis

Riddle JP^a, Smith HE^a, Jones CJ^a.

^aDivision of Primary Care and Public Health, Brighton and Sussex Medical School, UK, BN1 9PH

Corresponding author

Dr Christina Jones

ⁱRoyal Alexandra Children's Hospital

Level 6

Eastern Road

Brighton

BN2 5BE

Email: c.jones@bsms.ac.uk

Tel: 01273 696955 ext:2409

Word count: 3603

ⁱ Permanent address

Abstract

There are 5.8 million caregivers providing support to the infirm, disabled or elderly in the United Kingdom. Caregivers experience adverse physical and mental health outcomes and increased mortality. Low cost, effective interventions are needed to increase the wellbeing of caregivers. Written emotional disclosure (WED) has been shown to improve health in a range of populations. This systematic review and meta-analysis aimed to establish whether WED improves the psychological and physical health of caregivers. Searches were conducted in Medline, EMBASE, CINAHL, BNI, PsycINFO, Cochrane Library from 1986 to 2015. Ten trials investigating WED (625 participants) met the inclusion criteria. Results from four studies (n=118) indicated that WED reduces trauma (SMD=-0.46, 95% CI -0.82, -0.09). Data from three studies (n=102) suggest that WED improves general psychological health (SMD=-0.46, 95% CI -0.86, -0.06). There was no evidence that WED improves depression, anxiety, physical symptoms, quality of life or burden. Observations suggest WED may be more effective for caregivers of less than 5 years. Studies were highly heterogeneous in regards to caregiver age, relationship to care recipient, impairment of care recipient, follow up period and outcome measures, with high or unclear bias often observed. More rigorous RCTs, with clearly described interventions and standardised outcome measures, are needed to confirm these findings.

Keywords (3-6): caregivers; psychological intervention; written emotional disclosure; Pennebaker; systematic review; meta-analysis

Abbreviations:

UK	United Kingdom
WED	Written emotional disclosure

26	PRISMA	Preferred Reporting Items of Systematic Reviews and Meta-analyses
27	SMD	Standardised mean difference
28	RCT	Randomised controlled trial
29	CI	Confidence interval
30	US	United States
31	ADHD	Attention deficit hyperactivity disorder
32	ADD	Attention deficit disorder
33	SQ	Symptom questionnaire
34	BSI	Brief symptom inventory
35	GHQ	General health questionnaire
36	MASQ	Mood and anxiety symptom questionnaire
37	PHQ-9	Patient health questionnaire
38	IES-R	Impact of events scale- revised
39	IES	Impact of events
40	PTDS	Posttraumatic diagnostic scale
41	ZBI	Zarit burden interview
42	ECI	Experiences of caregiving inventory
43	SCL-90-R	Symptom checklist 90-R
44	HADS	Hospital anxiety and depression scale
45	CES-D	Center for epidemiological studies depression scale

46

Background

A caregiver is an unpaid individual who assists another person with day-to-day activities including eating, personal hygiene and other essential tasks (Care Act, 2014). In the United Kingdom (UK), there are approximately 5.8 million caregivers (1 in 10 adults) providing support to the infirm, disabled or very elderly (Office for National Statistics, 2013). The caregiving role can lead to increased depression, anxiety, burden, post-traumatic stress and decreased self-efficacy (Bandeira et al., 2007; Obeidat, Bond, & Callister, 2009; Ory, Hoffman, Yee, Tennstedt, & Schulz, 1999; Pinquart & Sorensen, 2007; Raina et al., 2005; Schulz et al., 2003; Schulz & Sherwood, 2008). Caregivers are more likely than non-caregivers to neglect their own physical health and to have poorer health, including higher blood pressure, impaired immune responses and increased mortality (Kiecolt-Glaser, Glaser, Gravenstein, Malarkey, & Sheridan, 1996; Schulz & Beach, 1999; Schulz & Sherwood, 2008; Shaw et al., 1999).

Various interventions to support caregivers have been evaluated. Short courses of combined cognitive behavioural and family therapy have been trialled with caregivers of children with cancer, with resultant improvement of post-traumatic stress symptoms (Kazak et al., 2004). Counselling, support groups, combined educational and psychological support sessions and family meetings have been shown to help caregivers of people with dementia, but these interventions have to be time intensive and multi-dimensional to be effective (Pinquart & Sorensen, 2006; Zarit, 2008; Zarit &, 1982). Such interventions are costly, requiring intensive support from highly trained professionals. Caregivers, who often find it difficult to attend support sessions because of caregiving commitments, would benefit from an intervention which can be easily accessed, not time intensive and one that can be undertaken at or close to home.

An example of a potentially appropriate intervention is written emotional disclosure (WED), a form of writing therapy first described by James Pennebaker and Sandra Beall in 1986 (Pennebaker & Beall, 1986). WED usually involves participants writing about a traumatic experience for 15-30 minutes a day for three to five days (Pennebaker & Beall, 1986). Individuals are instructed to write continuously and freely about their deepest feelings, without concern for spelling and grammar (Pennebaker & Beall, 1986; Pennebaker, 1997). In a large meta-analysis of a highly heterogeneous sample, WED appears to have psychological and physical health benefits (Frattaroli, 2006). Individual studies have shown a range of positive effects, such as reduced symptoms in patients with rheumatoid arthritis, improved lung function in patients with asthma and fewer health centre visits among first year university students (Smyth, Stone, Hurewitz, & Kaell, 1999; Smith et al., 2015; Pennebaker, Colder, & Sharp, 1990). However the impact of WED is not universally positive: in some groups a null effect has been found (e.g. WED had no effect on suicidal ideation or feelings of bereavement) (Kovac & Range, 2011; Stroebe, Stroebe, Schut, Zech, & van den Bout, 2002) suggesting that it may be an effective therapy for some sub-groups but not for all. Given there is evidence that intensive psychological interventions are beneficial but impractical for caregivers, we conducted a systematic review and meta-analysis to determine if WED, a brief, easily accessible and low cost alternative intervention, can improve caregivers' psychological and physical health.

Methods

This systematic review and meta-analysis follows the Preferred Reporting Items for Systematic Reviews and Meta-analyses guidelines (PRISMA) (Moher, Liberati, Tetzlaff & Altman, 2009).

97

98 *Eligibility criteria*

99 Trials were eligible for inclusion if they 1) were randomised controlled trials (RCTs) or
100 controlled trials, 2) investigated the use of WED as described by Pennebaker and Beall
101 (Pennebaker & Beall, 1986), 3) reported quantitative outcome measures, 4) included
102 participants who were caregivers (defined as unpaid individuals providing care to others
103 including, but not limited to, family members, children, parents and spouses) (Care Act,
104 2014). If the trial involved more than one intervention it was included if WED was a separate
105 arm, enabling extrapolation of the effects of WED alone. Studies were excluded if they were
106 solely qualitative. Similarly, studies that used subsets of data published in full elsewhere were
107 not included, thus to preventing any duplication of data.

108

109 *Search strategy*

110 Three methods were used to search for studies testing the effects of WED in caregivers.
111 Firstly, keyword searches were carried out in Medline, EMBASE, CINHALL, BNI, PsycINFO
112 and the Cochrane library (Appendix 1) for the period 1986 (the year of publication of the
113 WED paradigm) (Pennebaker & Beall, 1986) to July 2015. The language or publication type
114 was not limited. Secondly, reference lists of all primary studies, qualitative studies and
115 review articles on the topic were searched for additional references. Citations were screened
116 by one reviewer (PR) and 20% were checked independently by the two other reviewers (HS
117 & CJ). All three reviewers confirmed the eligibility of the identified studies. Thirdly, to find
118 studies nearing publication, experts in the field were contacted and the British Psychological
119 Society was asked to email their members requesting details of any ongoing work that used
120 writing therapy with caregivers.

121

Data extraction

Data extracted from each study were entered into a summary table to enable comparison of study characteristics. The table was compiled by one reviewer (PR) and checked for accuracy by the other reviewers (HS & CJ) (Table 1). Where studies were eligible but not all relevant data could be obtained from the publication, authors were contacted. As there was variation in the frequency and duration of follow-up measurement between studies, data were extracted only for the final follow-up.

Quality assessment of studies

Each study was analysed for bias using the Cochrane Collaboration's criteria (Higgins & Green, 2011). The risk of bias in each subcategory was classified as high, low or unclear. The assessment of bias was conducted independently by two authors (PR and CJ) and decisions were compared and discussed to achieve consensus (Table 3).

Data Analysis

All outcomes were measured as continuous data. End point scores were expressed as mean differences (MDs) or standardised mean differences (SMDs) with 95% confidence intervals (CIs). Heterogeneity of the studies was assessed by visual inspection of the forest plots and calculation of the I^2 statistic using RevMan 5.2 (RevMan, 2012). An I^2 up to 25% indicates low heterogeneity; up to 50% indicates moderate heterogeneity; and 75% or greater, high heterogeneity. Investigation of heterogeneity was not performed as a minimum of 10 studies are required for subgroup analyses (Higgins & Green, 2011). We performed the meta-analysis using RevMan 5.2 software (RevMan, 2012), using random effect models if $I^2 \geq 50\%$, and fixed effects if $I^2 < 50\%$.

Results

Study selection

The search strategy identified 2287 studies for possible inclusion, 2267 were excluded after reading the title or abstract. The full texts of 20 studies were accessed to determine eligibility and ten met the inclusion criteria (Figure 1). These ten were reviewed for study design, participant characteristics, intervention and outcomes and the relevant data were entered into Review Manager (RevMan, 2012).

Study characteristics

Eight studies measured seven outcomes and supplied data suitable for meta-analysis (Ashley, O'Connor, & Jones, 2011; Barry & Singer, 2001; Barton & Jackson, 2008; Duncan et al., 2007; Jones et al., 2015; Mackenzie, Wiprzycka, Hasher, & Goldstein, 2007; Martino, Freda, & Camera, 2013; Schwartz & Drotar, 2004). There were five studies which measured four outcomes that could not be pooled due to insufficient detail or only a single study reported on that outcome (Schwartz & Drotar, 2004; Whitney & Smith, 2014; Zauszniewski, Musil, Burant, & Au, 2014; Martino, Freda, & Camera, 2013; Jones et al., 2015). Attempts to obtain extra information about these studies were unsuccessful as authors were uncontactable or unable to provide the required information. The results were therefore divided into two sections to report meta-analytic results and review results.

Nine of the studies were published between 2001 and 2014, and one study was in press (Jones et al., 2015). Follow up periods varied between the immediate post-intervention assessment and six months. Four of the studies were conducted in the United States (US) (Barry & Singer, 2001; Schwartz & Drotar, 2004; Whitney & Smith, 2014; Zauszniewski et al., 2014), three in the UK (Ashley et al., 2011; Barton & Jackson, 2008; Jones et al., 2015),

one in Canada (Mackenzie et al., 2007), Israel (Duncan et al., 2007) and Italy (Martino et al., 2013). Six studies had one intervention group and one control group (Barry & Singer, 2001; Barton & Jackson, 2008; Jones et al., 2015; Martino et al., 2013; Schwartz & Drotar, 2004; Whitney & Smith, 2014), two studies had two intervention groups and one control group (Ashley et al., 2011; Mackenzie et al., 2007), and one study had four intervention groups and one control group (Zauszniewski et al., 2014). In one study the same group acted as both control and intervention (Duncan et al., 2007) (Table 1).

A total of 625 participants were included in this review. Four studies trialled WED in caregivers of adults (Ashley et al., 2011; Barton & Jackson, 2008; Jones et al., 2015; Mackenzie et al., 2007) and the other six were conducted in caregivers of babies or children (Barry & Singer, 2001; Duncan et al., 2007; Martino et al., 2013; Schwartz & Drotar, 2004; Whitney & Smith, 2014; Zauszniewski et al., 2014). Caregivers of adults were parents, spouses, children or sisters, and they were caring for individuals with a range of mental and physical problems, such as dementia, cognitive impairment, physical disability, cancer (Ashley et al., 2011; Mackenzie et al., 2007), and psychosis (Barton & Jackson, 2008; Jones et al., 2015). Caregivers of children were predominantly biological parents (in particular mothers) as well as adopted mothers, aunts and grandmothers. The care recipients were babies on neonatal intensive care units (Barry & Singer, 2001), children at the start of their off-therapy phase of Acute Lymphoblastic Leukaemia (Martino et al., 2013), healthy grandchildren (Zauszniewski et al., 2014), children with cancer (Duncan et al., 2007), “hard to parent” children with conditions such as Asperger’s Syndrome, autism, sensory processing disorder, ADHD/ADD, oppositional defiant disorder (Whitney & Smith, 2014) and children with chronic disease (Schwartz & Drotar, 2004). Details of the interventions used and a full list of outcomes and measures used in each study are described in Tables 1 and 2.

*Meta-analytic findings**General psychological health*

Three studies reported data that were suitable for pooling for this outcome (n=102) (Barry & Singer, 2001; Barton & Jackson, 2008; Mackenzie et al., 2008). The data showed a significant improvement in the WED group compared with control: WED was effective in reducing impairment in general psychological health (SMD=-0.46, 95% CI=-0.82,-0.06). The data had low heterogeneity ($I^2=14\%$ $p=0.31$) (Figure 2).

Trauma

Data from four studies measuring trauma were pooled (n=118) (Barry & Singer, 2001; Barton & Jackson, 2008; Duncan et al., 2007; Mackenzie et al., 2007). The data showed that WED was effective in reducing trauma (SMD=-0.46, 95% CI=-0.82, -0.09). The data had low heterogeneity ($I^2=0\%$ $p=0.48$) (Figure 3).

Other measures of psychological and physical wellbeing

Evidence from seven studies (n=363) (Ashley et al., 2011; Barton & Jackson, 2008; Duncan et al., 2007; Jones et al., 2015; Mackenzie et al., 2007; Martino et al., 2013; Schwartz & Drotar, 2004) showed no effect of WED on depression (SMD=0.00, 95% CI = -0.23, 0.23). Six studies (n=355) (Ashley et al., 2011; Barton & Jackson, 2008; Jones et al., 2015; Mackenzie et al., 2007; Martino et al., 2013; Schwartz & Drotar, 2004) showed no effect of WED on anxiety (SMD=0.01, 95% CI=-0.44, 0.46). Two studies (n=77) (Barton & Jackson, 2008; Mackenzie et al., 2007) showed no effect on burden (SMD= 0.11, 95% CI -0.39, 0.60). Four studies (n=177) (Barton & Jackson, 2008; Mackenzie et al., 2007; Martino et al., 2013; Schwartz & Drotar, 2004) showed no effect on somatic symptoms or physical health (SMD=-

0.19, 95% CI=-0.67, 0.28). Two studies (n=82) (Jones et al., 2015; Schwartz & Drotar, 2004) showed no effect on physical (SMD=-0.29, 95% CI -0.78, 0.20) or mental health related quality of life (SMD=0.43, 95% CI -0.02, 0.88).

Review findings

Stress, mood, depression and health related quality of life

There were three studies reporting outcomes for stress (Schwartz & Drotar, 2004; Whitney & Smith, 2014; Zauszniewski et al., 2014). One study found that the intervention group experienced higher total stress post intervention (mean (SD) = 36.97(1.12)) compared with the control (mean (SD) = 35.44 (.79)) (p=.017) (Whitney & Smith, 2014). Schwartz and Drotar (2004) found no differences between intervention and control group for stress (Intervention follow up mean (SD) = 29.98 (8.93); Control follow up mean (SD) = 27.46 (9.97))(p=0.74). Only one study found significantly reduced stress, this was in written and spoken emotional disclosure groups compared with control groups (p<.05) (Zauszniewski et al., 2014).

Schwartz and Drotar (2004) measured short term and long term mood. Controlling for baseline scores, they found no significant difference between intervention and control groups for either long term or short term mood (Schwartz & Drotar, 2004). Martino et al. (2013) also measured long term mood, but only reported on subscale scores and not total scores. They found that the intervention group showed improved scores on the tension-anxiety (F(1,41)=9.82, p<.01) and fatigue-inertia subscales (F(1,41)=4.25, p<.05), but that there was no significant difference between intervention and control groups for depression-dejection (F(1,41)=1.81, p>.05), anger-hostility (F(1,41)=2.58, p>.05) or confusion-bewilderment (F(1,41)=3.66, p>.05) (Martino et al., 2013).

Two studies reported data regarding depression. Jones et al., (2015) reported data from two depression measurement scales (PHQ-9 and HADS). As only one measure from each study can be included under each construct for meta-analysis, the PHQ-9 data were pooled as its primary outcome for depression. Controlling for baseline scores, there was no significant difference between intervention and controls for depression ($F(1,27)=.17, p=.69$). Zauszniewski et al. (2014) concluded that there was no significant change in depressive symptoms for participants receiving only expressive writing or spoken emotional disclosure compared with controls at 18 week follow up ($p<.05$).

Overall health related quality of life

Only one study reported on quality of life: Zauszniewski et al.'s (2014) assessments using the Short Form-12 showed no difference at final follow up between control and expressive writing or spoken emotional disclosure for general quality of life ($p>.05$).

Risk of bias

Overall, the methods of the included studies were of poor quality: risk of bias in most domains was classified as unclear or high. The areas in which studies were found to be particularly lacking were incomplete outcome data and selective outcome reporting. The details of risk of bias assessment for each study are presented (Table 3).

Discussion

This review and meta-analysis investigated the effect of written emotional disclosure (WED), a form of writing therapy, on the mental and physical health of informal caregivers. Meta-analysis demonstrated that WED alleviates symptoms of trauma and avoidance (a subscale of

trauma) and can significantly improve general psychological health in caregivers. Our meta-analysis found no evidence of efficacy on outcomes of depression, anxiety, burden, intrusion, somatic symptoms/physical health, health-related quality of life (physical and mental).

Assessment of the review findings showed conflicting results regarding the impact of WED on stress and long term mood, with some studies showing benefit and others no effect. The review also showed no effect on depression or health-related quality of life which is consistent with the results of the meta-analysis.

Our meta-analysis showed that for the majority of physical and psychological outcome measures, WED had no effect. However, a moderate reduction in impaired general psychological health was reported across three studies (Barry & Singer, 2011; Barton & Jackson, 2008; MacKenzie et al., 2007) and reduced trauma across four (Barry & Singer, 2011; Barton & Jackson, 2008; MacKenzie et al., 2007; Duncan et al., 2007). The moderate effect size in both outcomes ($SMD=-0.46$) compare favourably to the most recent meta-analytic findings of WED in cancer patients which reported no significant effects on participants' psychological and physical health (Zachariae & O'Toole, 2015). This supports the theory that participants need to be sufficiently impaired to show benefit, but not so impaired that the biological disease processes override the potential psychosocial influences of WED (Smith et al., 2015).

One possible explanation for the improvement in trauma and general psychological health may be that the duration of caregiving is moderating any effect of WED on outcomes. In the studies which demonstrated improvements, all three studies measuring trauma and all four studies measuring general psychological health, included caregivers of less than five years compared to the 7-14 year range reported in other studies. This may suggest that WED is

effective for those participants with less established caregiver-related impairment of psychological health and trauma. Possible mechanisms to explain this effect should be investigated in further trials of WED in caregivers.

There is an apparent anomaly in our observations where improvement has only been found for general psychological health and trauma and not anxiety and depression which you would usually expect to be strongly related. This may be explained by the longer duration of caregiving in the studies measuring anxiety and depression. The majority of studies (four of the six studies measuring anxiety and four of the seven studies measuring depression) included caregivers of more than seven years. This in turn may mean that the benefit of WED is diluted by the inclusion of longer-term caregivers.

Strengths and limitations

This is the first meta-analysis to focus on WED in caregivers, previously caregivers have been included within diverse patient groups. In the largest meta-analysis of WED reporting benefit in a wide range of healthy and unwell participants, only one study of caregivers was included (Frattaroli, 2006). A further strength of this review and meta-analysis is that it examines a specific psychological intervention. Previous reviews of treatments for caregivers have not focussed on one therapy but instead examined a range of therapies. For example, a review of 21 RCTs examining interventions to support caregivers of people with severe mental illness found evidence from three studies that psychoeducation, support groups and problem solving bibliotherapy reduce psychological distress for up to six months, but the authors were unable to conclude which intervention to recommend (Yesufu-Udechuku A. et al., 2015).

Whilst the methodology of the review and meta-analysis are robust the included studies do have some limitations. There was wide variation in the period of follow up, nature of impairment of the care-recipient, and outcome measures used for assessment of participants. The nature of impairment of the care-recipient is likely to have a substantial influence on the experience of caregiving. For example, distress is found to be twice as likely in caregivers of people with neurological conditions compared with those caring for people without (Mitchell et al., 2015). Care-recipient impairment should be considered in future sub-group analyses if there are sufficient numbers of trials available.

A further limitation of the included studies was the overall quality: risk of bias was unclear or high in many of the domains assessed and many of the trials did not report a sample size calculation, with some studies including very small samples. Our conduct of a meta-analysis is within recognised practice, however we acknowledge that with such few studies available, results should be interpreted with caution. This review and meta-analysis could potentially be enhanced by the inclusion of data from some unpublished studies. In particular we identified abstracts where the data was contained in doctoral and master's theses held in libraries in the US. Extensive effort was made to obtain these dissertations, including contacting the authors, their supervisors and the libraries, but all to no avail. Due to the low number of studies (<10), tests for funnel plot asymmetry were inappropriate as the power of the tests is too low to distinguish chance from real asymmetry (Higgins & Green, 2011).

Implications for practice

We found some support for the beneficial role of WED for informal caregivers. Results indicate that individuals relatively new to caregiving may infer greater benefit, suggesting that early intervention is important in this population. None of the studies reported on safety,

but because WED is generally thought to be a safe intervention, with only transient distress reported (Hockemeyer, Smyth & Anderson, 1999), this lack of formal safety data would not deter implementation. Given the practicality and inexpensive nature of the intervention, WED could be offered widely, however our analysis suggests it may be more beneficial to those with a shorter duration of caregiving.

Implications for research

Many of the trials included in this review were of poor methodological quality. To rectify this future RCTs need to be powered adequately, they need to select validated and previously used outcome measures to facilitate meta-analyses, and to publish the study protocol in advance to reduce the risk of bias when reporting outcomes. There is justification for further research investigating the duration of caregiving and its potential moderating effect on physical and psychological health. The longest follow up assessment reported in the studies was six months: a longer term follow up would be useful to determine sustainability of the effect of WED. Very few studies in this review investigated caregiver physical health. WED is known to improve physical health in other populations, and as caregivers are at higher risk of physical illnesses, this outcome should be investigated further. Similarly, there is a need to ascertain and report any adverse events and not just assume WED is safe.

Caregivers require assistance beyond that which is made available to the care recipient. Caregivers are patients in their own right and their needs must be assessed and met. This review has shown that WED may be an effective intervention to improve caregiver's general psychological health and reduce trauma, particularly amongst those relatively new to the caregiving role. As our population ages and community care becomes more prevalent, it will

371 become increasingly important to support caregivers, reducing their psychological and
372 physical burden and so further research will be needed in application of WED.

373

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Appendix 1

Capital letters indicates the use of MESH terms.

PsycINFO, Medline, BNI, CINHAI, EMBASE

1. Exp CAREGIVERS/
2. Exp PARENTS/
3. Exp FAMILY MEMBERS/
4. Exp CREATIVE WRITING/OR exp JOURNAL WRITING/
5. Exp WRITTEN COMMUNICATION/
6. Pennebaker ti,ab
7. 1 OR 2 OR 3
8. 4 OR 5 OR 6
9. 7 AND 8

COCHRANE Library

1. WRITTEN EMOTIONAL DISCLOSURE
2. WRITING THERAPY

Figure 1– PRISMA diagram displaying procedure for article selection (Moher et al (Moher, 2009, Jul 21.).

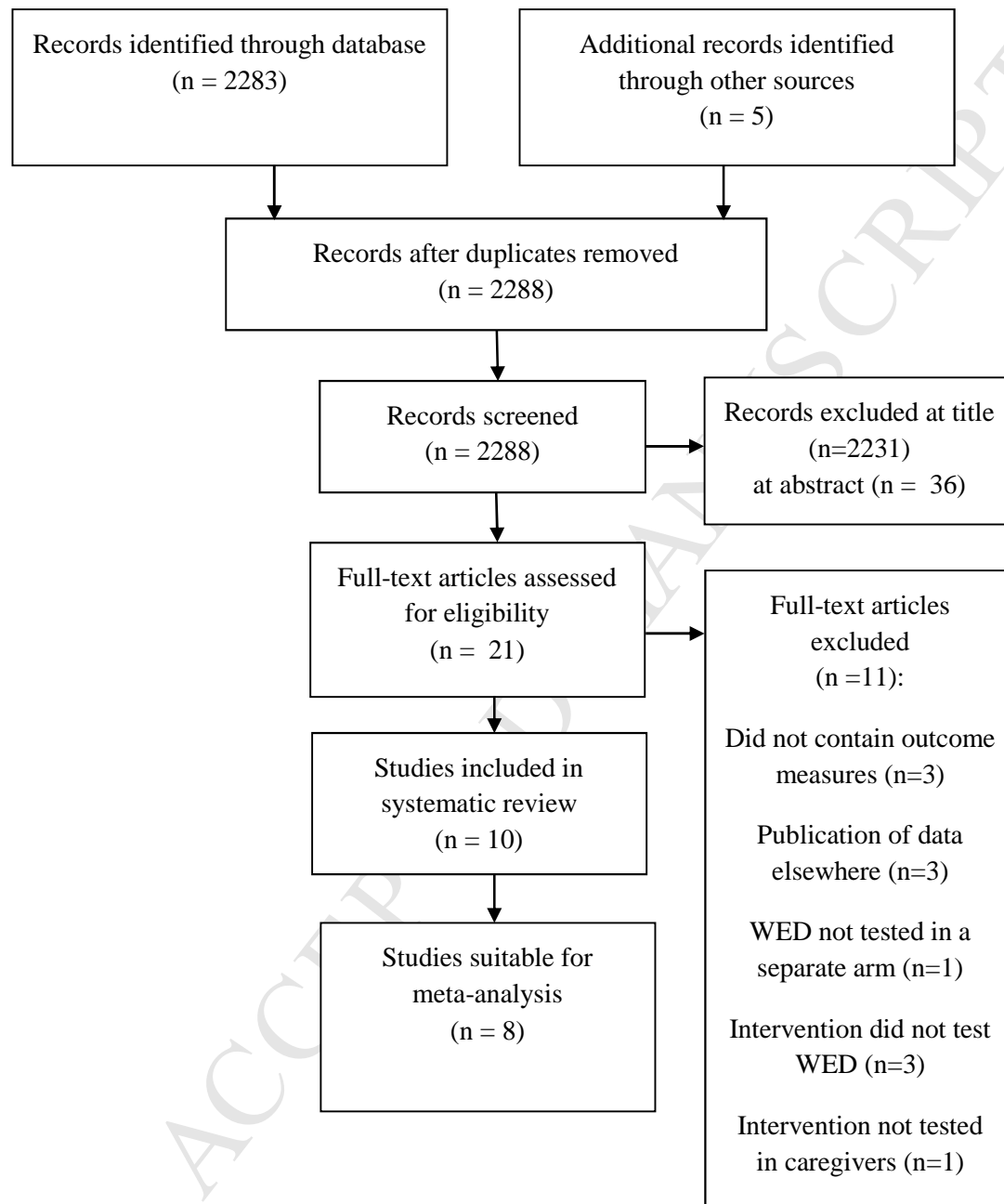


Figure 2 – table and forest plot of pooled data comparing the efficacy of WED against control for general psychological health

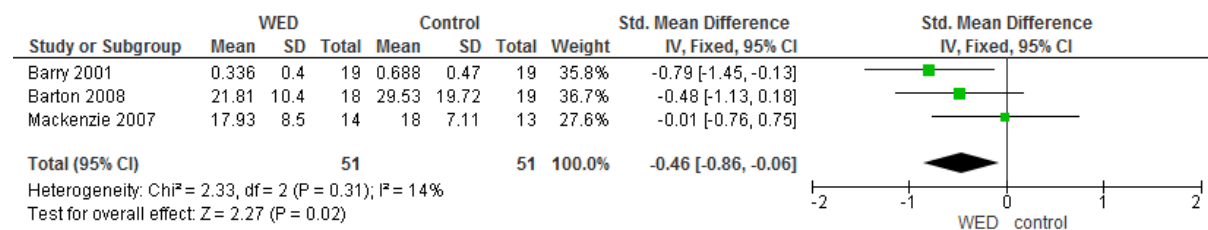
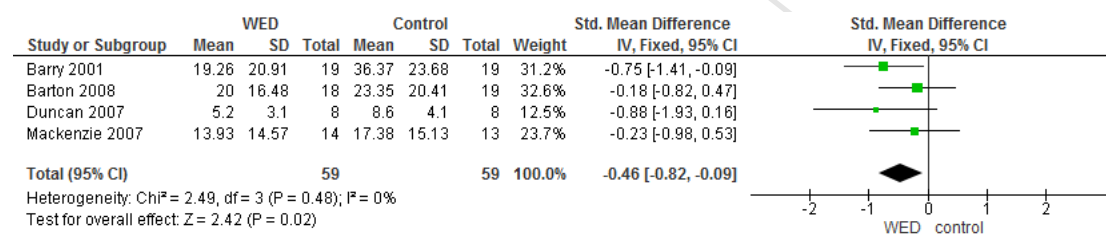


Figure 3 – table and forest plot of pooled data comparing the efficacy of WED against control for trauma



WED in caregivers

Table 1 Characteristics of included studies

Author, date, study design	Participants	Intervention	Follow up period	Measures	Key Results
Ashley et al. 2011 RCT	150 informal carers. Age, mean years: 56 Ethnicity: 90% white Gender: 85% female Years caring, mean: 10 Caregivers were relatives, friends, or neighbours of the carer and had a variety of day-to-day needs or disabilities.	Writing about stressful caregiving experience (n=51) vs writing about positive events (n=51) vs control: factual writing describing landscape pictures (n=48) Participants instructed to write at home for 20 minutes on three consecutive days without regard for spelling/ grammar; quiet room; assured of confidentiality and no feedback	At baseline then at 2 weeks, 2 months and 4 months after intervention	Psychological distress (Depression and Anxiety subscales of the Brief Symptom Inventory) Alexithymia – (Toronto Alexithymia Scale completed at baseline.) Regression checks conducted to see if alexithymia affected outcome.	The three writing groups had similar levels of depression and anxiety throughout follow up. Multivariate analyses found that lower levels of alexithymia were associated with reduced depression and anxiety in control and positive writing groups, but not the WED ('stress') group
Barry and Singer 2001 RCT	38 mothers of infants in a NICU for at least 1 week in past 14 months. Maternal Age, mean years: 33 Ethnicity: 71% Anglo-Caucasian (Gender and Years spent caring N/A)	Expressive writing about emotional experiences from pregnancy to present day (n=19) vs control: assigned to a waiting list (n=19) Participants instructed to write in a journal for at least 30 minutes on 4 consecutive days. Asked to try to write alone in a quiet and relaxed place. Control group received a letter telling them they were on a waiting list.	Pre-test and 4 weeks after intervention	Psychological distress – (Symptom Check List-90-R (SCL-90-R)) Trauma: intrusion, avoidance and hyper-arousal subscales (Impact of Events Scale-Revised (IES-R))	The treatment group improved in both outcome measures whereas the control group did not.
Barton and Jackson 2008 RCT	37 informal caregivers. Age, mean years: 45 Ethnicity: 38% Black British/ Caribbean, 27% White European, 22% Asian	Expressive writing or speaking about the first psychotic episode (n=18) vs control: writing about time management (n=19) Participants instructed to write (or speak) on three occasions for 20	At baseline, immediately after the intervention and 12 weeks later	Trauma – (Impact of Events Scale – Revised (IES-R)) Physical and Psychological health - (General Health	Those participants reporting symptoms of traumatic stress were most likely to experience reduced trauma as a result of the intervention. Otherwise, there was no significant effect of intervention on any outcome

WED in caregivers

	Pakistan/ India, 14% Other Gender: 89% Female Years caring, mean: 3	minutes over a 3 week period. Participants choose where sessions took place (90% elected at home).		Questionnaire-28 (GHQ-28))	measure.
	The majority of caregivers were the mother of the care recipient. Care recipients met the ICD-10 criteria for psychosis.			Caregiver burden – (Experience of Caregiving Inventory (ECI))	
Duncan et al. 2007	8 parents with a child who was diagnosed with cancer at least 2 months before the start of the study.	Guided Written Disclosure (WED) regarding child's cancer diagnosis. One session carried out individually at outpatient clinic. Writing carried out by parent alone. Full session lasted 30 minutes.	Parents assessed twice (one month gap between measuring) before undergoing intervention (to create control group) and one month after the GDP.	Post-traumatic stress syndrome (PTSS) - (Posttraumatic Diagnostic Scale (PTDS))	Post intervention symptoms of PTSS were reduced but symptoms of depression were not. However after controlling for child gender, the changes in PTSS were not significant.
Single group intervention	Parent age mean years:36 Child age, years:7.5 Months since diagnosis: 14.7 Parent gender: 87.5 % Female	Control group: treatment group acted as a control group before undergoing intervention (measures taken twice before undergoing GDP)		Depression – (Center for Epidemiological Studies Depression Scale).	
Jones et al 2015	28 parents of adults with psychosis	Treatment group: WED regarding a stressful experience that continues to bother caregiver (n=14) vs control: subjective writing regarding a typical day's activities (day 1), previous day's food consumption (day 2), how leisure time is spent (day 3) (n=14).	1 month and 3 months post intervention	Depression (PHQ-9)/HADS Depression. Anxiety (HADS Anxiety)	Feasibility study focusing on acceptability of WED for caregivers of people with psychosis.
RCT (pilot/feasibility)	Age, mean: 59.5 Gender: 96.4% female Ethnicity :Not supplied Mean age of care recipient: Not supplied Years caring, mean:14			Health related quality of life (RAND)	Study authors did not comment on the quantitative scores supplied.
Mackenzie et al. 2007	40 informal caregivers. Age, mean years: 62 Ethnicity: 100% white Gender: 73% Female Years caring, mean: 5	Expressive writing regarding current caregiver stress and burden (n=14) vs factual writing about time management (n=13) vs control: factual writing about historical events (n=13)	At baseline and one month after intervention	Caregiver burden (Zarit Burden Interview (ZBI)) Trauma: intrusion and avoidance subscales (Impact of events scales (IES))	There was no significant difference between expressive writing or historical writing groups throughout follow up. However the time management group showed improvement on a range of outcomes at follow up.
RCT	Most care recipients were either parents of or spouses	Participants instructed to write in a			

WED in caregivers

	to the carer. Care recipients were physically and cognitively disabled older people.	private, quiet room for 20 minutes on four non-consecutive days within a two week period, without regard for spelling/ grammar; assured of confidentiality and no feedback		Physical and psychological health, including Anxiety & Insomnia and Severe Depression subscales (General Health Questionnaire (GHQ)) Mood – (POMS)	
Martino et al. 2013	46 parents of children at the start of off-therapy phase for Acute Lymphoblastic Leukaemia (ALL).	Treatment group performed written disclosure over 3 sessions in a quiet room in the hospital. First session parents asked to describe events, in chronological order Second session, asked to write about their emotions at the time of the described events. In final sessions, asked to write about expectation of the future n=23 vs control group - no writing or other task assigned, received standard care/support (n=23)	Post-intervention (10-15 days) – T1 and Follow up –T2 (40-45 days)	Anxiety, Depression, Somatic Symptoms, Hostility - (Symptom Questionnaire (SQ)) Emotional processing – (EP Scale)	The experimental group showed improved anxiety, depression, somatic symptoms, hostility, tension-anxiety and fatigue-inertia at follow up. The control group did not. Written disclosure is effective among those participants who show good emotional processing skills, the benefits of disclosure are impeded in those with poor emotional processing skills.
Control trial	Age mean years: 40 Gender: 57% Female Ethnicity: Not supplied Years spent caring: not supplied (age of child supplied) Mean age of children four – eight years (different mean ages reported for sex of child and arm of study)	Treatment group intervention in 2009 and control group collected in 2010			
Schwartz and Drotar 2004	54 caregivers of hospitalized children and adolescents with a chronic illness	Treatment group asked to write about the most traumatic and upsetting experiences of their entire life (n=29) vs control group asked to write about what they did last summer (n=25).	Immediately after writing (each session) and 4 months later	Depression and anxiety – (Mood and Anxiety Symptom Questionnaire (MASQ)) Long term Mood – Profile of Mood States (POMS) Health related QOL – (Short Form Health Status Questionnaire) Caregiver stress (Caregiver Appraisal Scale) Physical Symptoms – (Pennebaker's Physical	There were no significant differences between intervention and control groups on most outcomes. The control group showed more vitality at final follow up than the intervention group and the intervention group had better physical functioning at final follow up compared with the control group.
RCT	Age mean years: 37 Ethnicity: 64% White 30% African American 6% Latino Parent gender: female 91% Mean age of children: Not supplied	Participants instructed to write (generally in the hospital room of their child) for 20 minutes on three days without regard for spelling/ grammar; assured of confidentiality and no feedback			

WED in caregivers

				Symptom Scale)	
				Short term Mood – (Brief Mood Rating Scale)	
Whitney and Smith 2014	122 mothers with children aged 3-18 who have a “difficult” or “hard-to-parent” child due to “socially disruptive conduct” resulting from diagnoses such as Autism, Asperger’s, non-verbal learning disorder and sensory processing disorder.	Treatment group: Emotional disclosure through online journal (n=56) vs control: placed on a waiting list and completed the intervention 8 weeks after treatment group (n=64)	Treatment group: before assigned to a group (T1) and after writing (T2)	Parenting stress – (Parenting Stress Index)	The intervention group showed higher stress levels at follow up than the control group. The intervention group also had higher levels of at follow up compared to baseline.
RCT	Age, mean: 41 Ethnicity: 91% Caucasian Mean age of Children: Not supplied		Control group: Before assigned to group (T1), immediately before writing (T2), after writing (T3)		However, the control group showed a significant reduction in stress after they received the intervention.
Zauszniewski et al. 2014.	102 grandmothers caring for grandchildren.	5 groups: Resourcefulness training (RT) consisting of personal and social strategies to increase resourcefulness reinforced by expressive writing about caring for grandchild (EW) n=20 vs RT reinforced by verbal disclosure (VD) (n=20) vs EW without RT (n=21) vs VD without RT (n=20) vs Attention control (AO) condition (n=21)	Baseline (T1) 2 weeks post intervention (T2) 6 weeks post (T3) 12 weeks post intervention (T4)	Stress – (Perceived Stress Scale (PSS))	Means and SDs supplied but not sample size of intervention and control groups
RCT	Age, mean: 58 Ethnicity: 60% African American, 32% Caucasian 2% Asian, 1% American Indian, 5% did not report Years caring, mean: 7	Write daily in a journal 3-5 pages or record verbal disclosure 5-7 minutes a day. 4 week intervention period. Attention control: Received weekly telephone calls from a research team member between T1 and T2.		Depression - (Center for Epidemiological Studies-Depression Scale (CES-D)) Quality of life: 2 subscales measuring psychological well-being and physical function - (Short Form 12 (SF-12)).	Resourcefulness training plus written/spoken disclosure groups improved the most but written/spoken disclosure groups alone also improved compared with control. Unpublished mean scores supplied but no SDs.

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Table 2. Outcome measures used by study

Domain	Outcome Measure	Study
Anxiety	Symptom Questionnaire (SQ) anxiety subscale	Martino et al., 2013 ^a
	Brief Symptom Inventory (BSI) anxiety subscale	Ashley et al., 2011 ^a
	Mood and Anxiety Symptom Questionnaire (MASQ) General distress: Anxiety subscale	Schwartz & Drotar, 2004 ^a
	Hospital Anxiety and Depression (HADS): Anxiety subscale	Jones et al., 2015 ^a
	General Health Questionnaire (GHQ) anxiety subscale	Barton & Jackson, 2008 ^a ; Mackenzie et al., 2007 ^a
Depression	SQ depression subscale	Martino et al., 2013 ^a
	BSI depression subscale	Ashley et al., 2011 ^a
	Patient Health Questionnaire 9 (PHQ-9)	Jones et al., 2015 ^a
	MASQ General Distress: depression subscale	Schwartz & Drotar, 2004 ^a
	Center for Epidemiological Studies Depression Scale	Duncan et al., 2007 ^a ; Zauszniewski et al., 2014 ^b
Trauma	GHQ depression subscale	Barton & Jackson, 2008 ^a ; Mackenzie et al., 2007 ^a
	HADS: depression subscale	Jones et al., 2015 ^c
	Impact of Events Scale (IES)	Mackenzie et al., 2007 ^a
	Posttraumatic Diagnostic Scale (PTDS)	Duncan et al., 2007 ^a
	Impact of Events Scale-Revised (IES-R)	Barry & Singer, 2001 ^a ; Barton & Jackson, 2008 ^a
Burden	Zarit Burden Interview (ZBI)	Barton & Jackson, 2008 ^a
	Experience of Caregiving Inventory (ECI)	Mackenzie et al., 2007 ^a
	Symptom Check List-90-R (SCL-90-R)	Barry & Singer, 2001 ^a
General psychological health	GHQ total score	Barton & Jackson, 2008 ^a ; Mackenzie et al., 2007 ^a
Somatic symptoms/ physical health	Pennebaker's Physical Symptom Scale	Schwartz & Drotar, 2004 ^a
	SQ physical health subscale	Martino et al., 2013 ^a
	GHQ-28 physical health subscale	Barton & Jackson, 2008 ^a ; Mackenzie et al., 2007 ^a
Health-related quality of life	RAND Physical Health and RAND Mental Health subscales	Jones et al., 2015 ^a
	Short Form Health Status Questionnaire Physical Health Summary Score and Mental Health Summary Score subscales	Schwartz & Drotar, 2004 ^a

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Stress	Short Form 12	Zauszniewski et al., 2014 ^b
	Caregiver Appraisal of Stressors Scale	Schwartz & Drotar, 2004 ^b
	Parenting Stress Index	Whitney & Smith, 2014 ^b
	Perceived Stress Scale	Zauszniewski et al., 2014 ^b
Mood	Profile of Mood States	Schwartz & Drotar, 2004 ^b ; Martino et al., 2013 ^b
	Brief Mood Rating Scale	Schwartz & Drotar, 2004 ^b

^aOutcome included in meta-analysis

^bOutcome included in review as insufficient data to include in meta-analysis

^cOutcome included in review as multiple outcomes used for same domain

WED in caregivers

Table 3. Risk of bias

Reference (first author)	Sequence generation (low/ unclear/ high risk of bias)	Allocation concealment (low/unclear/ high risk of bias)	Blinding (low/unclear/ high risk of bias)	Incomplete outcome data (low/unclear/ high risk of bias)	Selective outcome reporting (low/unclear/ high risk of bias)	Other sources of bias (low/unclear/ high risk of bias)
Ashley Mackenzie Barton	Low High Unclear	High Unclear Unclear	High Unclear Unclear	High High High	High High High	Unclear Unclear High – eight participants opted to speak rather than write about their experiences
Barry	Low	Unclear	High	Low	High	High – payment for participation; no check of intervention fidelity;
Martino	High	High	Unclear	High	High	High – control group not assigned a writing task
Duncan	Low	Unclear	Unclear	High	High	High – control group was also intervention group
Zauszniewski	Unclear	Unclear	High	High	High	High – payment for participation
Schwartz	Unclear	Unclear	Low/Unclear	High	High	Unclear
Whitney	Low	Unclear	Unclear	High	High	High – control group not assigned a writing task; control and intervention group were not comparable
Jones	Low	Unclear	Low	Low	High	Unclear

Highlights

- This systematic review and meta-analysis aimed to establish whether written emotional disclosure (WED) improves caregiver psychological and physical health
- WED was found to reduce symptoms of trauma and improve general psychological health of informal caregivers
- There was no effect of WED on depression, anxiety, somatic symptoms, quality of life or caregiver burden
- WED appears to be more effective for caregivers of less than five years
- More rigorous RCTs with clearly described interventions and standardised outcome measures are required

Conflicts of interest

Ms J. P. Riddle, Prof H.E. Smith and Dr C.J. Jones declare that they have no conflict of interest.